Supporting Information

Boyko et al. 10.1073/pnas.0902129106

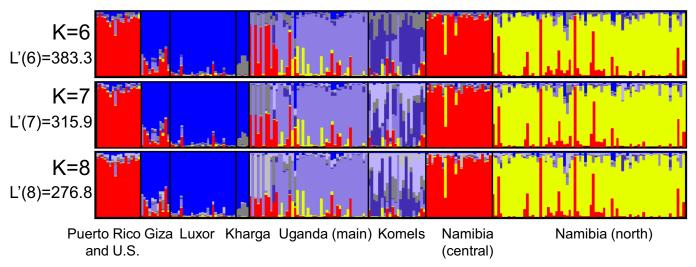
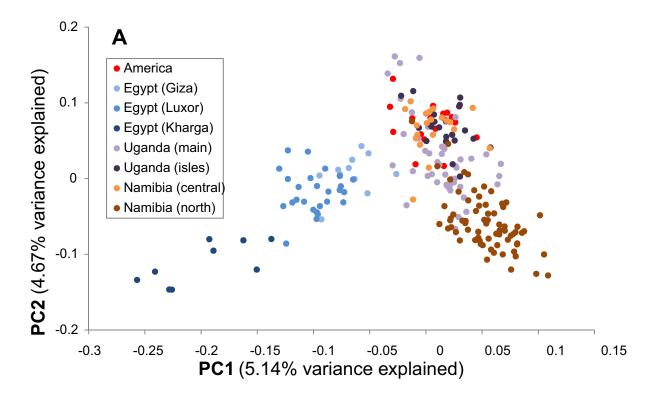


Fig. S1. STRUCTURE results as in Fig. 2 for higher K. L'(K) defined as L(K)-L(K-1) where L(K) is the average of the mean In likelihood across all 10 runs for a given K. L'(K) = 1499.4, 1214.3, and 646.7 for K = 3, 4, and 5, respectively.



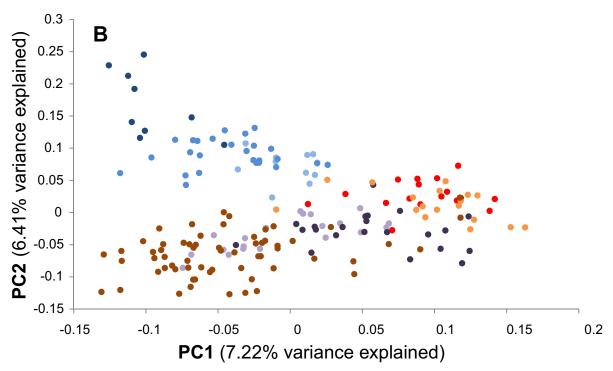


Fig. S2. Principal component analysis of African village dogs (all including admixed individuals) and American dogs. (A) PCA with the 89 microsatellite loci (n = 227). (B) PCA with the 300 SNP loci (n = 186).

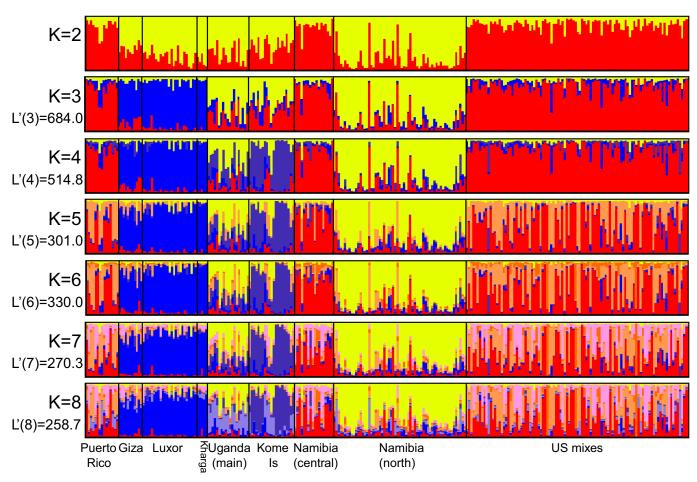


Fig. S3. STRUCTURE analysis of 184 village dogs and 102 complex mixed breed dogs from the United States at 300 SNP loci.

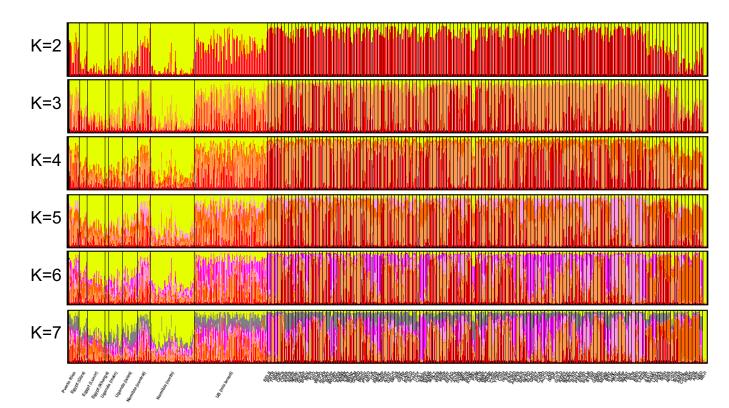


Fig. S4. STRUCTURE analysis of village dogs and dogs from 126 dog breeds using 300 SNP loci. An African cluster is apparent at K = 2 while subsequent clusters detect structure between breed dog groups. L'(K) declines sharply beyond K = 6 (L'(K) = 2280.5, 1899.8, 1638.5, 1609.2, and 1122.0 for K = 3-7, respectively).

African village + breed dog microsatellite PCA

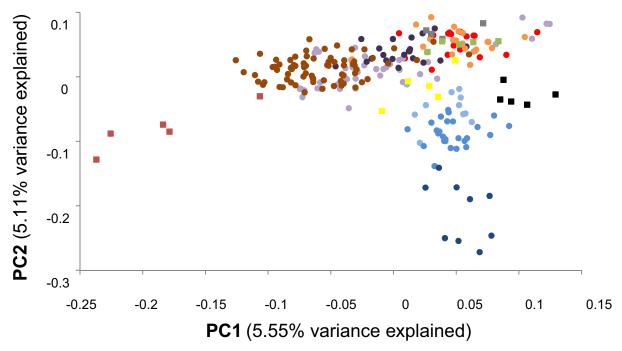


Fig. S5. Principal component analysis of village dogs and dogs from five putatively African and Middle Eastern breeds across 89 microsatellite markers in 227 village dogs and 24 breed dogs.

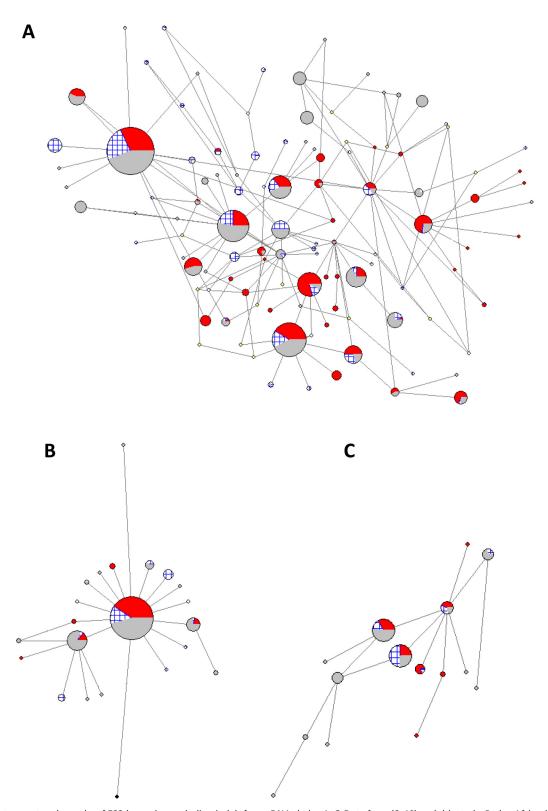


Fig. S6. Haplotype network graphs of 582-bp region excluding indels for mtDNA clades A–C. Data from (6, 10) and this study. Red = Africa, blue hatching = East Asia; gray = other. Area of node proportional to number of dogs with that haplotype.

Table S1. Summary of sampling locations

Country	Region	Location name	N	N (nonrel)	N (auto)	Mal	Fem	I/?/M	Location	Elev	Date	mt DNA haplotypes
gypt	Giza	Animal Friends	11	11	11	6	5	7/4/0	30° 02.724′ N, 31° 14.190′ E	80′	08/15/07	vilA1 (2), vilA2 (3), vilA5 (2), vilC3a, vilC2, vilA11a, vilA12
gypt	Luxor	shelter ACE (Animal Care in Egypt)	10	9	9	2	8	9/0/0	25° 41.406′ N, 32° 39.139′ E	240′	08/17/07	vilA3 (3), vilC1a (2), vilA4, vilA2, vilC2, vilA6
gypt	Kharga	Bagdad	7	4	7	3	4	4/0/0	24° 44.819′ N, 30° 35.524′ E	82′	08/18/07	vilB1a (3), vilB2
gypt	Kharga	Jeddah	2	1	2	1	1	1/0/0	24° 52.949′ N, 30° 33.912′ E	138′	08/18/07	vilB1a
gypt	Luxor	Gouahera	6	6	5	2	4	5/0/0	25° 41.406′ N, 32° 39.139′ E	240′	08/19/07	vilA1, vilA3, vilA7 (2), vilA8 (2)
gypt	Luxor	Armanti	1	1	1	0	1	1/0/0	25° 37.028′ N, 32° 32.565′ E	261′	08/19/07	vilC1a [or vilC1b]
gypt	Luxor	La Galta	1	1	1	1	0	1/0/0	25° 40.974′ N, 32° 36.876′ E	266′	08/19/07	vilA6
gypt	Luxor	Ezba	2	2	2	2	0	2/0/0	32° 37.311′ E	276′		vilB1b, vilC1b
gypt	Luxor	Comb	2	2	3	0	2		25° 42.163′ N, 32° 36.417′ E	251′		vilB1b, vilC1b
gypt	Luxor	Bairat	2	2	2	0	2		25° 42.718′ N, 32° 37.428′ E	254′		vilA9, vilA10
gypt	Luxor	Jazeera	4	3	4	4	0		25° 42.421′ N, 32° 37.782′ E	258′		vilA3, vilA7, vilC4
Jganda	mainland	Napoli	10	10	3	7	3		1° 02.99′ N, 34° 10.892′ E	3780′		vilA1 (3), vilA2, vilA11a (2), vilA11b (2), vilA13, vilB1b
Jganda Jganda	mainland mainland	Walchwaba Namabasa	10 9	10 9	5 3	4	6 5		1° 02.805′ N, 34° 10.957′ E 1° 06.39′ N,	3780′ 3653′	07/17/07	vilA6, vilA11a (2), vilA11b (2), vilA13 (5) vilA11a (4), vilA15,
Jganda	mainland	Mooni	20	20	3 7	9	11		34° 09.726′ E 1° 03.532′ N,	3703′	07/17/07	vilB1b (3), vilC3b
Jganda	mainland	Busoba	10	10	5	6	4		34° 12.078′ E 0° 58.133′ N,	3926′	07/18/07	vilA32 (5), vilB1b (5), vilC3b vilA2, vilA6 (4), vilA13,
Jganda	mainland	Buchenda	1	1	1	1	0		34° 10.237′ E 0° 57.514′ N,	3925′	07/18/07	vilA25, vilA33 (2), vilB4
Jganda	mainland	Bunanimi	6	6	3	2	4		34° 18.194′ E 0° 57.596′ N,	4026′	07/18/07	
Jganda	mainland	Nugisu	7	7	3	5	2		34° 11.597′ E 1° 05.376′ N,	3665′	07/18/07	vilA16, vilA27 vilA1, vilA2, vilA14,
Jganda	mainland	Navigyo	4	4	1	3	1	1/0/0	34° 10.766′ E 1° 05.095′ N,	3631′	07/18/07	vilA16, vilA25 (2), vilB1b vilA5 (3), vilC2
Jganda	mainland	Butandiga	16	15	4	9	7	3/1/0	34° 10.977′ E 1° 04.334′ N,	3814′	07/19/07	vilA2, vilA6, vilA7,
									34° 12.093′ E			vilA13, vilA16, vilA23, vilA32, vilB1b (7), vilB4
Jganda	mainland	Kongoidi	7	7	3	4	3	3/0/0	1° 11.915′ N, 34° 07.152′ E	3777′	07/19/07	vilA2, vilA6 (4), vilB1b (2)
Jganda	mainland	Komosingo	20	19	8	10	10	6/1/0	1° 12.584′ N, 34° 07.950′ E	3804′	07/19/07	vilA2, vilA6 (8), vilA11a (2), vilA15, vilA24, vilA29,
Jganda	isles	Mwoma (Ddamba Is.)	8	7	6	6	2	5/0/0	0° 2.414′ S, 32° 46.557′ E	1135′	08/10/07	vilB1b (5) vilA23 (2), vilA30 (4), vilB1b
Jganda	isles	Busiro (Koome Is.)	3	2	2	3	0	2/0/0	0° 1.952′ S, 32° 44.843′ E	1135′	08/10/07	vilA30, vilB1b
Jganda	isles	Tabaliro (Nsadzi Is.)	5	4	5	3	2	3/2/0	0° 5.203′ S, 32° 35.750′ E	1135′	08/10/07	vilA5 (3), vilA6
Jganda	isles	Kisigala (Koome Is.)	7	6	5	5	2	5/0/0	0° 5.603′ S, 32° 41.094′ E	1135′	08/10/07	vilA31 (4), vilB1b (2)
Jganda	isles	Zingoola (Koome Is.)	11	11	5	9	2	3/2/0	0° 3.319′ S, 32° 42.941′ E	1135′	08/11/07	vilA2, vilA11a, vilA23, vilA31 (3), vilB1b (5)
Namibia	central	Otavi	6	6	5	3	3	0/0/5	19° 39.192′ S, 17° 27.937′ E	5035′	08/23/07	

Country	Region	Location name	N	N (nonrel)	N (auto)	Mal	Fem	I/?/M	Location	Elev	Date	mtDNA haplotypes
Namibia	north	Oshivelo	4	4	4	2	2	2/0/2	18° 36.957′ S, 17° 09.995′ E	3627′	08/23/07	vilA13 (2), vilB1b, vilC5
Namibia	north	Oshikango	6	6	6	3	3	6/0/0	18° 36.957′ S, 17° 09.995′ E	3626′	08/24/07	vilA11a, vilA13, vilA15 (3), vilB1b
Namibia	north	Onhuno	6	6	4	4	2	3/1/0	17° 30.905′ S, 15° 54.126′ E	3629′	08/24/07	vilA2, vilA13 (2), vilA17, vilB1b (2)
Namibia	north	Ongha	6	6	5	6	0	4/0/1	17° 38.623′ S, 15° 55.651′ E	3615′	08/24/07	vilA7, vilA11a, vilA16, vilA18, vilB1b, vilB1a
Namibia	north	Indiangungu	6	5	4	6	0	4/0/0	17° 47.694′ S, 16° 00.280′ E	3650′	08/24/07	vilA7, vilA11a, vilA18, vilA19, vilB3a
Namibia	north	Ondandwa	6	6	6	2	4	5/1/0	17° 54.945′ S, 15° 58.605′ E	3595′	08/24/07	vilA11a, vilA13, vilA15, vilA16, vilA20, vilB3b
Namibia	north	Olund	6	6	4	3	3	2/1/1	17° 55.261′ S, 16° 0.123′ E	3573′	08/25/07	
Namibia	north	Omaarara	7	7	4	5	2	4/0/0	17° 51.249′ S, 15° 52.894′ E	3606′	08/25/07	vilA5 (3), vilA11a, vilA13, vilA19 (2)
Namibia	north	Okanbjengedhi	11	11	7	6	5	6/0/1	17° 47.145′ S, 15° 43.760′ E	3597′	08/25/07	vilA11a (3), vilA13 (2), vilA15, vilA20, vilA21, vilB1b (2), vilC5
Namibia	north	Oshikuku	6	6	4	4	2	3/1/0	17° 39.419′ S, 15° 29.081′ E	3606′	08/25/07	
Namibia	north	Omavela	5	5	5	3	2	5/0/0	17° 42.038′ S, 15° 43.372′ E	3588′	08/25/07	vilA11a, vilA13, vilA23, vilB1b, vilB3a
Namibia	north	Endola	7	7	6	5	2	6/0/0	17° 35.841′ S, 15° 43.313′ E	3630′	08/26/07	vilA5, vilA11a, vilA13 (3), vilA17, vilA20
Namibia	north	Onyvulae	9	9	8	9	0	8/0/0	18° 04.315′ S, 16° 31.653′ E	3656′	08/26/07	-
Namibia	north	Onyati	3	3	2	1	2	2/0/0	18° 13.108′ S, 16° 24.927′ E	3609′	08/26/07	
Namibia	north	Cham-Cham	5*	4	5	2	2	1/3/0	18° 28.495′ S, 16° 57.160′ E	3603′	08/26/07	vilA13 (2), vilA16, vilC6
Namibia	central	Tsumeb	11	11	9	7	4	0/1/8	19° 14.942′ S, 17° 42.197′ E	4223′	08/26/07	vilA13 (2), vilA14 (3), vilB1b (2), vilB1a, vilC2 (3)
Namibia	central	Grootfontaine	12	11	11	6	6	0/0/ 11	19° 35.234′ S, 18° 06.170′ E	4693′	08/27/07	vilA7, vilA11a (4), vilA13, vilA16 (4), vilC3a
America	Indiana	Tippecanoe Cty Humane Society	1	1	1	0	1	0/0/1	40° 24.089′ N, 86° 53.753′ W	604′	08/23/07	
America	Virginia	Norfolk SPCA	1	1	1	1	0	0/0/1	36° 51.190′ N, 76° 14.878′ W	23′	07/05/07	vilB1b
America	Puerto Rico	Albergue de Mayaguez	5	5	5	4	1	0/0/5	18° 12.760′ N, 67° 7.708′ W	948′	06/29/07	vilA13 (2), vilA27, vilA28, vilB1b
America	Puerto Rico	Albergue de Ponce	11	10	11	4	7	0/0/ 10	18° 00.356′ N, 66° 38.911′ W	94′	06/30/07	vilA2 (2), vilA11a (3), vilA16, vilA25, vilA26, vilB1b (2)

I/?/M denotes number of indigenous (<25% admixed), uncertain (25–60% admixed), and admixed (>60% admixed) dogs (unrelated genotyped dogs only) N (nonrel) denotes number of dogs sequenced across D-loop, excluding relatives; N (auto) denotes number of dogs with SNP and/or microsatellite genotyping *Sex was not recorded for one dog from Cham-Cham

Table S2. Pairwise F_{ST} in village dogs between regions based on 89 microsatellite markers

	Giza	Kharga	Luxor	NA_cent	NA_north	UG_isles	UG_main	America
Giza	_							
Kharga	7.79%	_						
Luxor	0.57%	7.35%	_					
NA_cent	2.22%	12.40%	4.42%	_				
NA_north	2.85%	11.01%	3.90%	3.71%	_			
UG_isles	4.35%	13.24%	5.62%	4.97%	5.18%	_		
UG_main	1.62%	10.33%	3.22%	2.50%	2.37%	2.47%	_	
America	2.38%	12.73%	4.13%	0.25%	3.55%	4.33%	2.22%	_

Table S3. Multiple sequence alignment of the 60 mtDNA haplotypes found in the 337 village dogs

vilA1	TG-TCCTCAACTTTCTGTTTAAATGTCCTACTCATTCACAGCAC					
vilA2						
vilA3						
vilA4						
vilA5	A.C.T					
vilA6						
vilA7						
vilA8						
vilA9						
vilA10						
vilA11a						
vilA11b	C					
vilA12						
vilA13						
vilA14						
vilA15						
vilA16						
vilA17						
vilA18						
vilA19						
vilA20	A.C					
vilA21	T					
vilA22						
vilA24						
vilA24						
vilA25	T					
vilA26						
vilA27	T					
vilA28						
vilA29						
vilA30	- C A					
vilA31						
vilA32						
vilA33						
vilA34	- G					
vilB1a	.A TT.C A GGA C CTTGT					
vilB1b	.A TT.C A GGA C CTTGT					
vilB2	.A T.TT.C A GGA C CTTGT					
vilB3a	.A T C A GGA C CTTGT					
vilB3b	.A T C A GGA C CTTGT					
vilB4	.A TT.C A G A C CTTGT					
vilC1a	.AT.TGC A.C.GC					
vilC1b	CAT.TGC A.C.GC					
vilC2	.AT.T C A.C.GCT C TTGT					
vilC3a	.AT.T C A.C.GC TTGT					
vilC3b	.AT.T C A.C.GC					
vilC4	.AT.T					
vilC5	.AT.T CT.A.C.GC					
vilC6	.AT.T CT.A.C.GC CC TTGT					

Table S4. Haplotype diversity in various regions in Africa (Pires et al., 2006 and this study) and East Asia (Savolainen et al., 2002).

Region	# Samples	# Haplotypes	Area 10 ³ km ²
Egypt	42	18	1002
NW Africa	29	15	163
Uganda	148	23	241
Namibia (north)	91	22	824
Japan	96	26	378
Sichuan	48	11	485
Tibet	23	13	1230
China (Non-specified)	22	10	9598
Shanxi	20	12	157
Korea	11	5	220
Thailand	10	9	513
Guangxi	8	6	237
Indonesia	7	5	1905
Liaoning	6	5	146
Mongolia	2	2	1564
Cambodia	2	2	181
Anhui	2	1	139
New Guinea	1	1	463
Philippines	1	1	300
Vietnam	1	1	332

Table S5. Microsatellite markers used in this study (see Parker et al., 2004, 2007)

VI#	Marker name	Chrom number	Dye label*	Annealing temp	MgCl ₂ conc	Electrophoresis conditions [†]	Notes
	REN285G14	1	PET	55	2	2ul,multiplexed	
	C01.673	1	VIC	58	1.5	2 ul, multiplexed	
	REN112I02	1	PET	58	1.5	2 ul, multiplexed	
	REN172C02	1	6-FAM	55	2	2 ul, multiplexed	
	FH2793	1	6-FAM	58	1.5	2 ul, multiplexed	
	REN143K19	1	6-FAM	55	2	2 ul, multiplexed	
	FH2890	2	VIC	55	2	2 ul, multiplexed	
	C02.466	2	NED	58	1.5	2 ul, multiplexed	
	C02.894	2	PET	55	1.5	2 ul, multiplexed	
1	FH2895	3	PET	58	1.5	2 ul, multiplexed	removed (missingness
2	REN157C08	3	VIC	55	2	2 ul, multiplexed	
3	C03.445	3	NED	55	1.5	2 ul, multiplexed	
4	FH2732	4	6-FAM	58	1.5	2 ul, multiplexed	
5	FH2776	4	VIC	58	1.5	2 ul, multiplexed	
6	REN160J02	4	PET	58	1.5	2 ul, multiplexed	
7	REN262N08	4	6-FAM	55	2	5–10 ul	
8	REN92G21	5	6-FAM	55	1.5	2 ul, multiplexed	removed (het deficit)
9	REN285I23	5	PET	55	2	2 ul, multiplexed	removed (net denet)
0	C05.414	5	PET	55	1.5	2 ul, multiplexed	
1	FH2752	6	6-FAM	58	1.5	2 ul, multiplexed	
2	REN210I14	6	NED	55	2	2 ul, multiplexed	
23		6	PET	58	1.5		
24	REN37H09	7	6-FAM	55		2 ul, multiplexed	
	REN97M11				2	2 ul, multiplexed	
5	REN286L19	7	VIC	58	1.5	2 ul, multiplexed	
26	FH2860	7	6-FAM	55	2	2 ul, multiplexed	
7	REN204K13	8	NED	55	2	2 ul, multiplexed	
8	C08.373	8	VIC	58	1.5	2 ul, multiplexed	
9	C08.618	8	NED	55	2	2 ul, multiplexed	
0	C09.173	9	NED	58	1.5	2 ul, multiplexed	
1	C09.474	9	6-FAM	55	2	2 ul, multiplexed	
2	FH2885	9	VIC	55	2	2 ul, multiplexed	
3	C10.781	10	6-FAM	55	2	2 ul, multiplexed	
4	REN73F08	10	VIC	55	2	2 ul, multiplexed	
5	REN154G10	10	NED	55	2	2 ul, multiplexed	
86	REN164B05	11	PET	55	2	2 ul, multiplexed	
37	FH2874	11	VIC	55	2	2 ul, multiplexed	
88	C11.873	11	VIC	58	1.5	2 ul, multiplexed	
10	REN213F01	12	VIC	55	2	2 ul, multiplexed	
11	REN208M20	12	6-FAM	58	1.5	2 ul, multiplexed	
12	REN94K11	12	VIC	55	2	2 ul, multiplexed	
14	REN286P03	13	PET	55	1.5	2 ul, multiplexed	
15	C13.758	13	6-FAM	55	2	2 ul, multiplexed	
16	C14.866	14	VIC	55	2	2 ul, multiplexed	
17	FH3072	14	NED	55	2	2 ul, multiplexed	
		15		55	2	2 ul, multiplexed	
18	FH3802		PET				
19	REN06C11	15	PET	55 50	1.5	2 ul, multiplexed	
0	REN144M10	15	6-FAM	58	1.5	2 ul, multiplexed	
1	REN85N14	16	6-FAM	58	1.5	2 ul, multiplexed	
2	FH3096	16	NED	55	2	2 ul, multiplexed	
3	C17.402	17	NED	58	1.5	2 ul, multiplexed	
4	REN50B03	17	PET	58	1.5	2 ul, multiplexed	
5	REN112G10	17	VIC	55	2	2 ul, multiplexed	
6	REN186N13	18	VIC	55	1.5	2 ul, multiplexed	
7	FH2795	18	NED	55	1.5	2 ul, multiplexed	
8	C18.460	18	PET	58	1.5	2 ul, multiplexed	
9	FH2783	19	NED	55	2	2 ul, multiplexed	
0	REN91114	19	VIC	55	1.5	2 ul, multiplexed	
51	REN274F18	19	NED	58	1.5	2 ul, multiplexed	
2	FH2887	20	6-FAM	55	2	2 ul, multiplexed	
3	FH3109	20	PET	55	1.5	2 ul, multiplexed	
4			VIC		1.5	2 ul, multiplexed 2 ul, multiplexed	
	REN293N22	20		55 55			
5	FH2914	21	VIC	55	2	2 ul, multiplexed	
6	FH3069	21	NED	55	2	2 ul, multiplexed	17.1
57	REN49F22	22	PET	55	2	5–10 ul	removed (missingness

M#	Marker name	Chrom number	Dye label*	Annealing temp	MgCl ₂ conc	Electrophoresis conditions [†]	Notes
68	REN107H05	22	NED	55	2	2 ul, multiplexed	removed (het deficit)
69	REN78I16	22	PET	55	1.5	2 ul, multiplexed	
70	FH3078	23	VIC	55	2	2 ul, multiplexed	
71	C23.277	23	NED	55	2	2 ul, multiplexed	
72	REN181K04	23	NED	58	1.5	2 ul, multiplexed	removed (het deficit)
73	REN106I06	24	PET	55	2	2 ul, multiplexed	
74	FH3083	24	PET	55	2	2 ul, multiplexed	removed (het deficit)
75	REN54E19	25	6-FAM	55	2	2 ul, multiplexed	
77	REN87O21	26	VIC	55	2	2 ul, multiplexed	
78	C26.733	26	NED	55	2	2 ul, multiplexed	
79	C27.442	27	VIC	55	2	2 ul, multiplexed	
80	C27.436	27	NED	55	2	2 ul, multiplexed	removed (het deficit)
81	REN72K15	27	PET	55	2	2 ul, multiplexed	
82	FH2759	28	PET	55	2	2 ul, multiplexed	
83	FH2785	28	6-FAM	55	2	2 ul, multiplexed	
84	REN239K24	29	VIC	55	2	2 ul, multiplexed	
85	FH3082	29	NED	55	2	2 ul, multiplexed	
86	REN51C16	30	VIC	55	2	2 ul, multiplexed	
87	FH3053	30	NED	55	2	2 ul, multiplexed	
88	REN43H24	31	NED	55	2	2 ul, multiplexed	
89	FH2712	31	PET	55	2	2 ul, multiplexed	
90	FH2875	32	6-FAM	55	2	5–10 ul	
91	FH2790	33	VIC	55	2	2 ul, multiplexed	
92	REN291M20	33	NED	58	1.5	2 ul, multiplexed	
93	REN160M18	34	PET	55	2	2 ul, multiplexed	
94	FH3060	34	6-FAM	55	2	2 ul, multiplexed	
95	REN314H10	34	VIC	55	2	2 ul, multiplexed	
96	REN01G01	35	NED	55	2	2 ul, multiplexed	
97	REN112C08	35	PET	55	2	2 ul, multiplexed	
98	REN106I07	36	PET	55	2	5–10 ul	
99	FH2708	37	VIC	55	2	2 ul, multiplexed	
100	REN86G15	38	NED	55	2	2 ul, multiplexed	

^{*}Fluorescent dye labeled primers are available through Applied Biosystems (ABI).

†Multiplexed markers were combined into groups of 2 to 4 different dyes colors post PCR.